

## APPENDIX 1

APPLICATION OF THE TARARA CLAIMS TO THE DISCLOSURE  
OF THE TARARA APPLICATION

Tarara Claims	Tarara Disclosure
<p>2. A composition comprising microspheres,</p> <p>wherein said microspheres have a wall thickness of 100 to 500 nm,</p> <p>and a bulk density of no more than 0.1 g/cm<sup>3</sup>.</p>	<p>As to the configuration, particularly preferred embodiments of the invention incorporate spray dried, hollow microspheres having a relatively thin porous wall defining a large internal void, although other void containing or perforated structures are contemplated as well. (p. 6, l. 7-12)</p> <p>In especially preferred embodiments the perforated microstructures will comprise a powder of dry, hollow, porous microspherical shells of approximately 1 to 10 <math>\mu\text{m}</math> or 1 to 5 <math>\mu\text{m}</math> in diameter, with a shell thickness of approximately 0.1 <math>\mu\text{m}</math> to approximately 0.5 <math>\mu\text{m}</math>. (p. 32, l. 21-23)</p> <p>Compositions according to the present invention typically yield powders with bulk densities less than 0.5 g/cm<sup>3</sup> or 0.3 g/cm<sup>3</sup>, preferably less than 0.1 g/cm<sup>3</sup> and most preferably less than 0.05 g/cm<sup>3</sup>. (p. 12, l. 26-28)</p>
<p>3. The composition according to claim 2, wherein the mean geometric particle size of said microspheres is less than 20 <math>\mu\text{m}</math>.</p>	<p>In especially preferred embodiments the mean geometric particle size (or diameter) of the perforated microstructures is less than 20 <math>\mu\text{m}</math> or less than 10 <math>\mu\text{m}</math>. (p. 32, l. 16-17)</p>

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4. A composition comprising microspheres, wherein said microspheres have a wall thickness of 43.5 to 261 nm, and a bulk density of no more than 0.1 g/cm <sup>3</sup> .	Conversely, the perforated microstructures produced using a relatively high PFC/PC ratio of approximately 45 (shown in Fig. 1F2 proved to be extremely hollow with a relatively thin wall ranging from about 43.5 to 261 nm. (p. 65, l. 3-6)
5. The composition according to claim 2 wherein the walls of said microspheres comprise albumin.	In this respect useful polymers comprise polylactides, polylactide-glycolides, cyclodextrins, polyacrylates, methylcellulose, carboxymethylcellulose, polyvinyl alcohols, polyanhydrides, poly lactams, polyvinyl pyrrolidones, polysaccharides (dextrans, starches, chitin, chitosan, etc.), hyaluronic acid, proteins, (albumin, collagen, gelatin, etc.). (p. 16, l. 22-25)
6. The composition according to claim 2 obtainable by spray-drying a wall-forming material in combination with a blowing agent.	As previously described, these blowing agents will preferably be incorporated in an emulsified feed stock prior to spray drying. (p. 24, l. 1-2)

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<p>7. The composition according to claim 2 wherein said microspheres comprise a bioactive agent.</p>	<p>As used herein, the term "bioactive agent" refers to a substance which is used in connection with an application that is therapeutic or diagnostic in nature, such as methods for diagnosing the presence or absence of a disease in a patient and/or methods for treating disease in a patient. (p. 8, l. 27-30)</p> <p>It will be appreciated that the perforated microstructures of the present invention may exclusively comprise one or more active or bioactive agents (i.e. 100% w/w). However, in selected embodiments the perforated microstructures may incorporate much less bioactive agent depending on the activity thereof. (p. 18, l. 17-20)</p>

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<p>8. The composition according to claim 7, wherein said microspheres comprise a protein or peptide.</p>	<p>Compatible bioactive agents comprise hydrophilic and lipophilic respiratory agents, pulmonary surfactants, bronchodilators, antibiotics, antivirals, anti-inflammatories, steroids, antihistaminics, leukotriene inhibitors or antagonists, anticholinergics, antineoplastics, anesthetics, enzymes, cardiovascular agents, genetic material including DNA and RNA, viral vectors, immunoactive agents, imaging agents, vaccines immunosuppressive agents, peptides, proteins and combinations thereof. (p. 19, l. 8-13)</p>
<p>9. The composition according to claim 7, wherein said microspheres comprise an active agent selected from the group consisting of insulin, growth hormone and interferon.</p>	<p>More specifically, exemplary medicaments or bioactive agents may be selected from, for example,... therapeutic proteins and peptides, e.g. DNase, insulin, glucagon, LHRH, nafarelin, goserlin, leuprolide, interferon, rhu IL-1 receptor, macrophage activation factors such as lymphokines and muramyl dipeptides, opioid peptides and neuropeptides such as enkaphalins, endorphins, renin inhibitors, cholecystokinins, DNase, growth hormones leukotriene inhibitors and the like. (p. 19, l. 17 to p. 20, l. 1)</p>

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<p>10. An inhaler comprising an inhalable formulation of microspheres</p> <p>wherein said microspheres have</p> <p>a wall thickness of 100 to 500 nm,</p> <p>and a bulk density of no more than 0.1 g/cm<sup>3</sup></p> <p>and wherein said microspheres comprise a bioactive agent.</p>	<p>The perforated microstructures will preferably be used in conjunction with inhalation devices such as a metered dose inhaler, dry powder inhaler or nebulizer for both topical and systemic delivery via pulmonary or nasal routes. (p. 1, l. 15-19)</p> <p>See claim 2 above.</p> <p>It will be appreciated that the perforated microstructures of the present invention may exclusively comprise one or more active or bioactive agents (i.e. 100% w/w). However, in selected embodiments the perforated microstructures may incorporate much less bioactive agent depending on the activity thereof. (p. 18, l. 17-20)</p>
<p>11. The inhaler according to claim 10, wherein the formulation comprises the microspheres as the sole or the predominant component thereof.</p>	<p>In this respect the present invention provides formulations wherein the medicament and the excipients or bulking agents are preferably associated with or comprise the perforated microstructures...Moreover, the ability to effectively deliver particulates without associated carrier particles simplifies product formulation, filling and reduces undesirable side effects. (p. 42, l. 15-26)</p>

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<p>12. A method for pulmonary administration of a bioactive agent wherein said method comprises the administration to the lungs of</p> <p>a composition which comprises microspheres having a wall thickness of 100 to 500 nm and a bulk density of no more than 0.1 g/cm<sup>3</sup>,</p> <p>wherein said microspheres further comprise a bioactive agent.</p>	<p>More particularly, the present invention may provide for the delivery of bioactive agents to selected physiological target sites using perforated microstructure powders. In preferred embodiments, the bioactive agents are in a form for administration to at least a portion of the pulmonary air passages of a patient in need thereof. (p. 4, l. 27-31)</p> <p>See claims 2 and 10 above.</p>
<p>13. The method according to claim 12, wherein the mean geometric diameter of said microspheres is less than 20 <math>\mu</math>m.</p>	<p>In especially preferred embodiments the mean geometric particle size (or diameter) of the perforated microstructures is less than 20 <math>\mu</math>m or less than 10 <math>\mu</math>m. (p. 32, l. 16-17)</p>
<p>14. A method for pulmonary administration of a bioactive agent wherein said method comprises the administration to the lungs of a composition which comprises microspheres having a wall thickness of 43.5 to 261 nm and a bulk density of no more than 0.1 g/cm<sup>3</sup>, wherein said microspheres further comprise a bioactive agent.</p>	<p>Conversely, the perforated microstructures produced using a relatively high PFC/PC ratio of approximately 45 (shown in Fig. 1F2 proved to be extremely hollow with a relatively thin wall ranging from about 43.5 to 261 nm. (p. 65, l. 3-6)</p>

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15. The method according to claim 12, wherein the walls of said microspheres comprise albumin.	In this respect useful polymers comprise polylactides, polylactide-glycolides, cyclodextrins, polyacrylates, methylcellulose, carboxymethylcellulose, polyvinyl alcohols, polyanhydrides, polylactams, polyvinyl pyrrolidones, polysaccharides (dextrans, starches, chitin, chitosan, etc.), hyaluronic acid, proteins, (albumin, collagen, gelatin, etc.). (p. 16, l. 22-25)
16. The method according to claim 12, wherein said microspheres are obtainable by spray-drying a wall-forming material, in combination with a blowing agent.	As previously described, these blowing agents will preferably be incorporated in an emulsified feed stock prior to spray drying. (p. 24, l. 1-2)
17. The method according to claim 12, wherein said microspheres comprise a protein or peptide.	Compatible bioactive agents comprise hydrophilic and lipophilic respiratory agents, pulmonary surfactants, bronchodilators, antibiotics, antivirals, anti-inflammatories, steroids, antihistaminics, leukotriene inhibitors or antagonists, anticholinergics, antineoplastics, anesthetics, enzymes, cardiovascular agents, genetic material including DNA and RNA, viral vectors, immunoactive agents, imaging agents, vaccines immunosuppressive agents, peptides, proteins and combinations thereof. (p. 19, l. 8-13)

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<p>18. The method according to claim 12, wherein said microspheres contain a bioactive agent selected from the group consisting of insulin, growth hormone and interferon.</p>	<p>More specifically, exemplary medicaments or bioactive agents may be selected from, for example, ... therapeutic proteins and peptides, e.g. DNase, insulin, glucagon, LHRH, nafarelin, goserlin, leuprolide, interferon, rhu IL-1 receptor, macrophage activation factors such as lymphokines and muramyl dipeptides, opioid peptides and neuropeptides such as enkaphalins, endorphins, renin inhibitors, cholecystokinins, DNase, growth hormones leukotriene inhibitors and the like. (p. 19, l. 17 to p. 20, l. 1)</p>
<p>19. A method for diagnosis wherein said method comprises administering to a patient in need of such diagnosis,</p> <p>a composition which comprises microspheres having a wall thickness of 100 to 500 nm and a bulk density of no more than 0.1 g/cm<sup>3</sup>.</p>	<p>As used herein, the terms "bioactive agent" refers to a substance which is used in connection with an application that is therapeutic or diagnostic in nature, such as methods for diagnosing the presence or absence of a disease in a patient and/or methods for treating disease in a patient. (p. 8, l. 27-30)</p> <p>See claim 2 above.</p>
<p>20. The method according to claim 19, wherein the mean geometric diameter of said microspheres is less than 20 <math>\mu</math>m.</p>	<p>In especially preferred embodiments the mean geometric particle size (or diameter) of the perforated microstructures is less than 200 <math>\mu</math>m or less than 10 <math>\mu</math>m. (p. 32, l. 16-17)</p>



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21. A method for diagnosis wherein said method comprises administering to a patient in need of such diagnosis, a composition which comprises microspheres having a wall thickness of 43.5 to 261 nm and a bulk density of no more than 0.1 g/cm <sup>3</sup> .	Conversely, the perforated microstructures produced using a relatively high PFC/PC ratio of approximately 45 (shown in Fig. 1F2 proved to be extremely hollow with a relatively thin wall ranging from about 43.5 to 261 nm. (p. 65, l. 3-6)
22. The method according to claim 19, wherein the walls of said microspheres comprise albumin.	In this respect useful polymers comprise polylactide, polylactide-glycolides, cyclodextrins, polyacrylates, methylcellulose, carboxymethylcellulose, polyvinyl alcohols, polyanhydrides, polylactams, polyvinyl pyrrolidones, polysaccharides (dextrans, starches, chitin, chitosan, etc.), hyaluronic acid, proteins, (albumin, collagen, gelatin, etc.). (p. 16, l. 22-25)
23. The method according to claim 19, wherein said microspheres are obtainable by spray-drying a wall-forming material, in combination with a blowing agent.	As previously described, these blowing agents will preferably be incorporated in an emulsified feed stock prior to spray drying. (p. 24, l. 1-2)

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<p>24. A method for preparing microparticles, wherein said method comprises spray-drying wall-forming materials and wherein said method further comprises inclusion of a blowing agent in the feedstock for spray-drying.</p>	<p>While the resulting spray-dried powdered particles typically are approximately spherical in shape, nearly uniform in size and frequently are hollow, there may be some degree of irregularity in shape depending upon the incorporated medicament and the spray drying conditions. In many instances dispersion stability and dispersibility of the perforated microstructures appears to be improved if an inflating agent (or blowing agent) is used in their production. Particularly preferred embodiments may comprise an emulsion with the inflating agent as the disperse or continuous phase. (p. 22, l. 12-18)</p>
<p>25. The method according to claim 24, wherein said blowing agent is selected from the group consisting of ammonium acetate, ammonium carbonate, and acids.</p>	<p>The inclusion of salts and organic solids such as ammonium carbonate, ammonium acetate, ammonium chloride or camphor as also contemplated. (p. 17, l. 22-23)</p> <p>Other optional components may include conventional viscosity modifiers, buffers such as phosphate buffers or other conventional biocompatible buffers or pH adjusting agents such as acids or bases, and osmotic agents (to provide isotonicity, hyperosmolarity, or hyposomolarity). (p. 29, l. 15-18)</p>

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26. The method according to claim 24, wherein said wall-forming material is albumin.	In this respect useful polymers comprise polylactide, polylactide-glycolides, cyclodextrins, polyacrylates, methylcellulose, carboxymethylcellulose, polyvinyl alcohols, polyanhydrides, polylactams, polyvinyl pyrrolidones, polysaccharides (dextrans, starches, chitin, chitosan, etc.), hyaluronic acid, proteins, (albumin, collagen, gelatin, etc.). (p. 16, l. 22-25)